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Paying the carbon debt: What are the true costs of the expanding biofuel industry

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Global biofuel production has grown massively in recent years due to factors such as rising oil prices and government initiatives.

Whilst displacement of petroleum fuels with biofuels may be able to reduce anthropogenic greenhouse gas emissions, hidden carbon costs may render this reduction insignificant.

A recent paper by Holly Gibbs of the Centre for Sustainability and the Global Environment (SAGE), published in *Environmental Research Letters*, quantified the carbon emissions resulting from biofuel expansion in the tropics and compared these emissions to the carbon savings from using biofuel instead of petroleum fuels.

The results are presented as a 'carbon payback time', or the number of years it takes for the carbon savings from avoided fossil fuel burning to offset the losses in ecosystem carbon from clearing agricultural land to grow new biofuel crops.

They found that growing new biofuel crops nearly always leads to net carbon emissions with carbon payback times ranging from decades to centuries. They found that carbon payback time was longest, between 300 and 1500 years, when low-yielding biofuel crops such as soy or maize replaced carbon-rich ecosystems such as tropical forest. This is already a reality in south-eastern Brazil where global demand for soy products has pushed farmers deeper into the Amazon rain forest.

Carbon benefits are found when growing biofuels on degraded lands where trees would not have to be cleared or by replacing other crops in current agricultural land. However, pressure of global food demand may limit the value of biofuel production in these areas.

This paper highlights the complexities of using biofuels as a 'cleaner' energy source, aimed at reducing climate change. It is vital that we fully understand all the costs and benefits of biofuel production in order to inform government and policy makers. We need to understand what a move towards biofuels actually means in terms of the long-term global carbon budget.

BBC news: Biofuels 'need strict standards'
ScienceNOW: Tropical biofuels getting less and less green

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